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Estimating Reading Ability Level from the AQE General Aptitude Index

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FOREWORD

The study described in this report was carried out in response to a Requirement for Personnel Research (RPR 65-15 as modified 4 August 1965), "Career Development Course Research." The RPR was originated by Headquarters Air University. The Air Staff monitor of the RPR was Mrs. Mabel O. Bruner, AFPDPCE. The study was carried out by Personnel Research Laboratory under Project 7717, Selection, Classification, and Evaluation Procedures for Air Force Personnel; Task 771705, Selection and Classification Instruments for Airman Personnel Programs.

This report has been reviewed and is approved.

James H. Ritter, Col USAF
Commander

ABSTRACT

Conversion tables are presented for estimating reading achievement (reading grade level as measured by the California Achievement Test and scaled score as measured by the Davis Reading Test) from the AQE General Aptitude Index. Distributions of estimated reading grade are shown for non-prior-service airmen entering the Air Force in 1964 and 1965 for the total group and for subgroups split on years of education completed. Distributions of estimated reading grade are also presented by career field for airmen assigned to 29 career fields. It was pointed out that a wide range of reading ability was found within each career field and that the career fields differed considerably with respect to average reading ability. Implications for writing of Career Development Courses and technical manuals were discussed.

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ESTIMATING READING ABILITY LEVEL FROM THE AQE GENERAL APTITUDE INDEX

I. BACKGROUND

The range of aptitudes among Air Force enlistees varies from extremely low (those enlistees who can barely achieve minimal enlistment standards) to extremely high (represented by that small percentage of enlistees who have the potential to complete postgraduate training at nearly any university). As a result of this range of aptitudes, large differences in reading ability exist among the airman population. Further, as a result of classification and initial assignment policies based largely on aptitudes, differences exist between the various career fields with respect to the average reading ability of airmen assigned thereto. With the advent of the increased emphasis in the Air Force on self-study courses, reading ability differences (and a method of measuring such differences) have become a matter of concern.

Present Air Force personnel procedures (AFM 35-1, and AFM 50-23) require that an airman complete a self-study Career Development Course in his specialty before he can be considered for skill upgrading. Not only is skill upgrading a necessary prerequisite to promotion for most airmen but such upgrading must be accomplished within certain prescribed maximum periods (AFR 39-4).

In order to properly evaluate student achievement in the Career Development Courses (CDCs), to determine whether reading training is necessary for a given individual before attempting a CDC, and to attempt to match the reading difficulty of particular CDCs with the reading ability level of airmen most likely to undertake them, it appeared essential to Air University personnel responsible for the CDC program that a standardized Air Force-wide measure of reading ability be developed. Consequently, Personnel Research Laboratory was asked to develop such a measure.

Because of the known high relationship (correlations of .71, .74, and .79) of the General Aptitude Index (AI) of the Airman Qualifying Examination (AQE) and reading ability (due in part to the inclusion of a reading vocabulary subtest in the General AI), it seemed that the General AI would serve adequately as a measure of reading ability, if conversion tables could be developed so that General AI scores could be easily expressed in terms of the score units (reading grade) typically resulting from tests of reading ability. This would not only save the Air Force the cost of developing a reading ability test but would save the expense of a special test administration each time it was desired to ascertain the reading ability of any airman or group of airmen. The General AI is recorded in every airman's personnel folder; thus his reading ability level could be quickly ascertained by use of a conversion table.

Two well-standardized civilian tests of reading ability (the California Test of Reading Vocabulary and Reading Comprehension, Form W, and the Davis Reading Test, Form 2A) were administered to samples of basic airmen along with AQE Form 64 (in counterbalanced order). Conversion tables were developed showing the reading grade level and scaled score corresponding to each AQE General AI level. The reading grade level conversion table was used to obtain distributions of reading ability for airmen in a number of career fields as estimated from their General AI scores.

II. THE CONVERSION TABLES

Means, standard deviations, and intercorrelations of the AQE and reading test variables are presented in Tables 34 and 35 in the Appendix. Distributions of the reading comprehension test scores entering into the conversion tables are also shown in the Appendix, Tables 36 and 37.

Each reading test yielded two scores: level of comprehension and vocabulary (California Test) and level of comprehension and speed of comprehension (Davis Test). Only the level of reading comprehension scores were used in developing the conversion tables, since neither reading speed nor reading vocabulary seemed especially relevant to the desired measure of reading ability. Conversion tables were developed by the equipercentile method between the General AI and the two tests of reading comprehension. The conversion table for the General AI – California Test is presented in Table 1 and that for the General AI – Davis Test is shown in Table 2. It should be noted that the two reading tests provide reading ability scores in different units of measurement and the conversion tables reflect this fact. Use of the California Test conversion table yields reading ability scores in terms of grade (8th grade, 9th grade, etc.) The Davis Test conversion table yields reading ability scores in scaled score form which can be related (via the test manual) to percentile rank standing in various grade groups (Grade 8 through college freshman). For most purposes the California Test conversion table probably will yield a more meaningful reading ability measure.

Table 1. **California Achievement Test, Form W, Reading Comprehension Grade Equivalents of General Aptitude Index Levels**

General AI	Grade Equivalent
95	15.0
90	14.5
85	14.0
80	13.0
75	12.5
70	12.0
65	11.5
60	11.0
55	10.0
50	9.5
45	9.0
40	8.5
35	8.0
30	7.5
25	7.0
20	6.5
15 & Below	6.0

The equipercentile method of developing conversion tables whereby the score any individual would be expected to achieve on one test can be estimated from his score on another test has been in use for many years and has a statistically sound basis. However, two conditions must be met before the conversion tables developed by this procedure can be expected

Table 2. **Davis Reading Test, Form 2A, Scaled Score Equivalents of General Aptitude Index**

General AI	Scaled Score Equivalent
95	82
90	80
85	78
80	75
75	72
70	71
65	68
60	67
55	66
50	65
45	64
40	62
35	61
30	60
25	58
20	54
15 & Below	53 & Below

to yield consistently accurate results. The first of these is that the two tests upon which the conversion table is based must be highly correlated with each other. The second condition is that the sample upon which the table is developed and the sample on which the table is to be applied must be random samples from the same population. If the relationship between the two tests is not high, the estimated scores of individuals may be inaccurate (too high or too low) although the average estimated score of a group may be quite accurate. If the samples on which the table is developed and applied are not random samples from the same population, the estimated scores of individuals may be consistently too high or too low (depending upon the precise manner in which the two samples differ) and the average estimated score of a group will also be too high or too low.

The correlations between the General AI and both reading tests are high (see Tables 34 and 35). The standard error of estimating reading grade level as measured by the California Test from the General AI is about 1.5 grades which means that the estimated reading grade of any individual would be more than 3 grades too high or too low only about 5 percent of the time. The average reading grade of a group could be estimated even more accurately (depending, of course, upon the size of the group).

The samples of basic trainees upon which the conversion tables were developed are reasonably representative of all basic airmen so that the tables can be used to estimate the reading ability scores of random samples of basics with fair accuracy. When the tables are applied to airmen in career field groups which are not random samples of the airman population, some bias may result. It should be noted also that the conversion table will not be accurate in certain special cases. For example, if an airman whose estimated reading ability is low, based on his General AI has had remedial reading training since his General AI was obtained, his actual reading ability will probably be somewhat higher than estimated.

III. ESTIMATED READING GRADE DISTRIBUTIONS OF SELECTED AIR FORCE GROUPS

The reading grade conversion table was applied to the General AI distributions of selected groups of airmen to obtain distributions of estimated reading grade levels.

In Tables 3 and 4 are shown the estimated reading grade distributions of non-prior-service airmen enlisting during calendar years 1964 and 1965. These tables are of primary usefulness as an indication of the level and wide range of reading ability among enlistees. Of interest is the relationship between reading ability and amount of education (Table 4), which indicates – not surprisingly – that as the amount of education increases, so does the average reading ability. Year by year, however, the average reading grade of enlistees lags behind the education grade, and the lag becomes greater as the amount of education increases. This finding is probably partly artifactitious due to the ceiling of grade 15 on the reading scale but probably also reflects a true difference as the result of self-selection on the part of the airmen.

Table 3. **Reading Comprehension Grade Distributions of Non-Prior-Service Basic Airmen[a]**

Reading Grade	1964 Enlistees[b]	1965 Enlistees[b]
15.0	7.5%	5.1
14.5	6.7	5.5
14.0	8.5	6.6
13.0	6.8	6.6
12.5	7.1	7.2
12.0	10.9	9.1
11.5	7.4	7.4
11.0	10.3	8.9
10.0	6.2	7.7
9.5	8.4	8.8
9.0	4.9	8.1
8.5	6.9	9.4
8.0	3.3	3.3
7.5	3.4	3.0
7.0	1.7	3.3
Mean Grade	11.4	11.0
Median Grade	11.8	11.3
SD	2.0	2.0

[a] Estimated from General AI

[b] 1964 = 6.9% High School Nongraduates
1965 = 12.7% High School Nongraduates

Tables 5 through 33 present distributions of estimated reading grade for groups of airmen assigned to technical training courses in a number of career fields.[1] These airmen enlisted during the 1961-1962 period; however they can be assumed to be reasonably representative of present input. The tables are grouped according to the selector aptitude index (General, Administrative, Mechanical, or Electronics) required for assignment to the particular career field.

[1] The career fields in the tables are numbered as in the United States Air Force Occupational Handbook.

Table 4. **Reading Comprehension Grade Distributions for Basic Airmen at Various Educational Levels[a]**

Reading Grade	High School Nongraduates	High School Graduates	1 Year College	2 Years College	3 Years College	College Graduate
15.0	1.4	4.3	15.8	23.6	32.3	28.3
14.5	2.2	5.3	13.0	14.7	14.0	18.5
14.0	4.3	7.2	12.3	13.0	13.7	14.2
13.0	4.2	6.6	9.9	9.4	7.5	10.3
12.5	5.5	7.2	9.1	7.5	6.1	6.9
12.0	9.1	10.2	10.5	8.5	6.7	7.0
11.5	7.8	7.7	6.0	5.4	4.5	3.2
11.0	11.5	10.0	6.5	5.6	5.6	3.7
10.0	9.3	7.3	4.0	3.2	2.4	1.5
9.5	11.2	9.1	4.7	3.3	2.8	2.4
9.0	9.2	6.8	2.6	2.1	1.0	1.5
8.5	11.3	8.5	3.2	2.0	1.9	1.2
8.0	4.3	3.7	1.0	0.7	0.6	0.5
7.5	4.1	3.6	0.9	0.7	0.6	0.4
7.0	4.6	2.5	0.5	0.3	0.3	0.4
Mean Grade	10.4	11.1	12.5	13.0	13.3	13.3
Median Grade	10.6	11.4	13.0	14.0	13.8	13.8
Percentage at Each Level	9.3	75.4	8.1	4.9	1.3	1.0

[a] Estimated from General AI. Sample = all 1964 and 1965 Non-Prior-Service Enlistees.

The distributions shown in Tables 5 through 10 for career fields for which the General AI was used in selection can be assumed to be reasonably accurate (that is, to contain no bias or constant error). The distributions for the other career fields for which an aptitude index other than the General AI was used in selection are probably biased to some extent. The direction and amount of these biases were estimated by means of multiple correlation techniques[2] and are indicated in Tables 11 through 33 as "probable errors." Thus, in Table 11, the probable error, shown as -1.0, indicates that the estimated reading grade for airmen in this career field (Non-Radio Communications) averages about one grade too low.

The data in these tables indicate that within each career field there is a wide range of reading ability and that the career fields for which data were available differ widely (grade 9.0 to grade 14.5) in the average reading ability of airmen assigned thereto. The data suggest that in preparing Career Development Courses (and other material such as technical manuals) an effort should be made to insure that the reading comprehension level of the course material should be at a level appropriate for the particular career field. The data also indicate that minimum completion times should be set with care so that the majority of the airmen taking each CDC can complete the required reading and study within the time limits.

[2] The application of the multiple correlation technique is shown in Appendix II along with alternative methods of estimating reading grade in career field groups (Tables 38 and 39).

Table 5. **Reading Comprehension Grade Distributions of Airmen Assigned to Career Field 4 – Photography[a]**

(N = 140)

General AI	Reading Grade Level	%	Cum %
95	15.0	4	4
90	14.5	3	7
85	14.0	6	13
80	13.0	11	24
75	12.5	12	36
70	12.0	13	49
65	11.5	12	61
60	11.0	17	78
55	10.0	11	89
50	9.5	6	95
45	9.0	2	97
40	8.5	3	100
Mean Reading Grade	11.7		
Median Reading Grade	11.9		

[a]Selector AI for Course 23230 – General

Table 6. **Reading Comprehension Grade Distributions of Airmen Assigned to Career Field 6 – Weather[a]**

(N = 451)

General AI	Reading Grade Level	%	Cum %
95	15.0	44	44
90	14.5	30	74
85	14.0	16	90
80	13.0	10	100
Mean Reading Grade	14.5		
Median Reading Grade	14.8		

[a]Selector AI for Course 25231 – General

Table 7. **Reading Comprehension Grade Distributions of Airmen Assigned to Career Field 7 – Air Traffic Control and Warning[a]**

(N = 1,856)

General AI	Reading Grade Level	%	Cum %
95	15.0	1	1
90	14.5	1	2
85	14.0	1	3
80	13.0	2	5
75	12.5	16	21
70	12.0	34	55
65	11.5	25	80
60	11.0	20	100
Mean Reading Grade	11.9		
Median Reading Grade	12.0		

[a]Selector AI for Courses 27230A, 27230B, 27330A, 27330B – General

Table 8. **Reading Comprehension Grade Distributions of Airmen Assigned to Career Field 8A – Electronic Countermeasures[a]**

(N = 424)

General AI	Reading Grade Level	%	Cum %
95	15.0	13	13
90	14.5	19	32
85	14.0	23	55
80	13.0	34	89
75	12.5	3	92
70	12.0	3	95
65	11.5	2	97
60	11.0	3	100
Mean Reading Grade	13.6		
Median Reading Grade	14.1		

[a]Selector AI for Course 29230 – General

Table 9. **Reading Comprehension Grade Distributions of Airmen Assigned to Career Field 41 – Air Police[a]**

(N = 3,113)

General AI	Reading Grade Level	%	Cum %
95	15.0	0	0
90	14.5	1	1
85	14.0	1	2
80	13.0	1	3
75	12.5	3	6
70	12.0	8	14
65	11.5	11	25
60	11.0	17	42
55	10.0	15	57
50	9.5	16	73
45	9.0	14	87
40	8.5	13	100
Mean Reading Grade	10.3		
Median Reading Grade	10.4		

[a]Selector AI for Course 77130 – General

Table 10. **Reading Comprehension Grade Distributions of Airmen Assigned to Career Field 43 – Medical[a]**

(N = 3,109)

General AI	Reading Grade Level	%	Cum %
95	15.0	4	4
90	14.5	7	11
85	14.0	11	22
80	13.0	16	38
75	12.5	14	52
70	12.0	22	74
65	11.5	11	85
60	11.0	15	100
Mean Reading Grade	12.5		
Median Reading Grade	12.5		

[a]Selector AI for Courses 90010, 90230, 92230, 90630, 90631, 90232, 90330, 90430, 90530 – General

Table 11. **Reading Comprehension Grade Distributions of Airmen Assigned to Career Field 8B – Communications (Non-Radio)[a]**

(N = 1,375)

General AI	Reading Grade Level	%	Cum %
95	15.0	1	1
90	14.5	2	3
85	14.0	2	5
80	13.0	4	9
75	12.5	5	14
70	12.0	9	23
65	11.5	9	32
60	11.0	10	42
55	10.0	10	52
50	9.5	9	61
45	9.0	8	69
40	8.5	8	77
35	8.0	7	84
30	7.5	7	91
25 & Below	7.0	9	100
Mean Reading Grade	10.0		
Median Reading Grade	10.1		
Probable Error	± 1.0		

[a]Selector AI for Courses 29130, 29131 – Administrative

Table 12. **Reading Comprehension Grade Distributions of Airmen Assigned to Career Field 8C – Radio Communication[a]**

(N = 2,315)

General AI	Reading Grade Level	%	Cum %
95	15.0	2	2
90	14.5	2	4
85	14.0	4	8
80	13.0	6	14
75	12.5	9	23
70	12.0	14	37
65	11.5	11	48
60	11.0	10	58
55	10.0	11	69
50	9.5	9	78
45	9.0	8	86
40	8.5	4	90
35	8.0	4	94
30	7.5	3	97
25 & Below	7.0	3	100
Mean Reading Grade	11.4		
Median Reading Grade	11.4		
Probable Error	± 0.2		

[a]Selector AI for Courses 29130, 29131 – Administrative

Table 13. **Reading Comprehension Grade Distributions of Airmen Assigned to Career Field 30A – Supply[a]**

(N = 3,481)

General AI	Reading Grade Level	%	Cum %
95	15.0	0	0
90	14.5	1	1
85	14.0	1	2
80	13.0	1	3
75	12.5	2	5
70	12.0	6	11
65	11.5	6	17
60	11.0	7	24
55	10.0	8	32
50	9.5	10	42
45	9.0	10	52
40	8.5	10	62
35	8.0	12	74
30	7.5	10	84
25 & Below	7.0	16	100
Mean Reading Grade	9.0		
Median Reading Grade	9.1		
Probable Error	± 1.2		

[a]Selector AI for Courses 64530, 64630, 64730 – Administrative

Table 14. **Reading Comprehension Grade Distributions of Airmen Assigned to Career Field 32 – Accounting & Finance[a]**

(N = 574)

General AI	Reading Grade Level	%	Cum %
95	15.0	6	6
90	14.5	6	12
85	14.0	5	17
80	13.0	11	28
75	12.5	10	38
70	12.0	18	56
65	11.5	9	65
60	11.0	11	76
55	10.0	8	84
50	9.5	7	91
45	9.0	5	96
40	8.5	2	98
35	8.0	1	99
30	7.5	0	99
25 & Below	7.0	1	100
Mean Reading Grade	12.2		
Median Reading Grade	12.2		
Probable Error	± 0.4		

[a]Selector AI for Course 67130 – Administrative

Table 15. **Reading Comprehension Grade Distributions of Airmen Assigned to Career Field 34A – Clerical Services[a]**

(N = 998)

General AI	Reading Grade Level	%	Cum %
95	15.0	2	2
90	14.5	2	4
85	14.0	5	9
80	13.0	6	15
75	12.5	9	24
70	12.0	17	41
65	11.5	11	52
60	11.0	11	63
55	10.0	10	73
50	9.5	8	81
45	9.0	7	88
40	8.5	5	93
35	8.0	3	96
30	7.5	2	98
25 & Below	7.0	2	100
Mean Reading Grade	11.2		
Median Reading Grade	11.6		
Probable Error	± 0.6		

[a]Selector AI for Courses 70130, 73230 – Administrative

Table 16. **Reading Comprehension Grade Distributions of Airmen Assigned to Career Field 34B – Administration[a]**

(N = 1,782)

General AI	Reading Grade Level	%	Cum %
95	15.0	1	1
90	14.5	1	1
85	14.0	2	4
80	13.0	2	6
75	12.5	6	12
70	12.0	9	21
65	11.5	8	29
60	11.0	9	38
55	10.0	9	47
50	9.5	9	56
45	9.0	8	64
40	8.5	9	73
35	8.0	9	82
30	7.5	8	90
25 & Below	7.0	10	100
Mean Reading Grade	9.6		
Median Reading Grade	9.8		
Probable Error	± 1.2		

[a]Selector AI for Course 70230 – Administrative

Table 17. **Reading Comprehension Grade Distributions of Airmen Assigned to Career Field 14A – Wire Maintenance[a]**

(N = 395)

General AI	Reading Grade Level	%	Cum %
95	15.0	1	1
90	14.5	1	2
85	14.0	2	4
80	13.0	4	8
75	12.5	6	14
70	12.0	15	29
65	11.5	11	40
60	11.0	12	52
55	10.0	10	62
50	9.5	10	72
45	9.0	9	81
40	8.5	9	90
35	8.0	4	94
30	7.5	3	97
25 & Below	7.0	3	100
Mean Reading Grade	10.5		
Median Reading Grade	11.1		
Probable Error	+ 0.3		

[a]Selector AI for Course 36130 – Mechanical

Table 18. **Reading Comprehension Grade Distributions of Airmen Assigned to Career Field 16A – Aircraft Accessory Maintenance[a]**

(N = 1,316)

General AI	Reading Grade Level	%	Cum %
95	15.0	3	3
90	14.5	4	7
85	14.0	5	12
80	13.0	8	20
75	12.5	7	27
70	12.0	10	37
65	11.5	11	48
60	11.0	11	59
55	10.0	10	69
50	9.5	9	78
45	9.0	7	85
40	8.5	5	90
35	8.0	5	95
30	7.5	2	97
25 & Below	7.0	3	100
Mean Reading Grade	11.1		
Median Reading Grade	11.4		
Probable Error	+ 0.7		

[a]Selector AI for Courses 42132, 42231, 42430 – Mechanical

Table 19. **Reading Comprehension Grade Distributions of Airmen Assigned to Career Field 17—Aircraft Maintenance***

(N = 11,093)

General AI	Reading Grade Level	%	Cum %
95	15.0	1	1
90	14.5	1	2
85	14.0	2	4
80	13.0	3	7
75	12.5	4	11
70	12.0	9	20
65	11.5	8	28
60	11.0	9	37
55	10.0	10	47
50	9.5	10	57
45	9.0	10	67
40	8.5	9	76
35	8.0	8	84
30	7.5	7	91
25 & Below	7.0	9	100
Mean Reading Grade	9.7		
Median Reading Grade	9.7		
Probable Error	0.0		

*Selector AI for Courses 43131, 43230, 43231—Mechanical

Table 20. **Reading Comprehension Grade Distributions of Airmen Assigned to Career Field 18—Missile Maintenance***

(N = 1,413)

General AI	Reading Grade Level	%	Cum %
95	15.0	6	6
90	14.5	7	13
85	14.0	9	22
80	13.0	10	32
75	12.5	14	46
70	12.0	16	62
65	11.5	10	72
60	11.0	8	80
55	10.0	7	87
50	9.5	4	91
45	9.0	3	94
40	8.5	2	96
35	8.0	2	98
30	7.5	1	99
25 & Below	7.0	1	100
Mean Reading Grade	12.0		
Median Reading Grade	12.3		
Probable Error	+ 0.8		

*Selector AI for Courses 44330, 44331—Mechanical

Table 21. **Reading Comprehension Grade Distributions of Airmen Assigned to Career Field 20—Motor Vehicle Maintenance[a]**

(N - 556)

General AI	Reading Grade Level	%	Cum %
95	15.0	2	2
90	14.5	3	5
85	14.0	2	7
80	13.0	8	15
75	12.5	8	23
70	12.0	14	37
65	11.5	10	47
60	11.0	12	59
55	10.0	10	69
50	9.5	9	78
45	9.0	7	85
40	8.5	6	91
35	8.0	4	95
30	7.5	2	97
25 & Below	7.0	3	100
Mean Reading Grade	11.1		
Median Reading Grade	11.4		
Probable Error	+ 0.7		

[a]Selector AI for Courses 47131, 47132—Mechanical

Table 22. **Reading Comprehension Grade Distributions of Airmen Assigned to Career Field 21—Metal Working[a]**

(N - 469)

General AI	Reading Grade Level	%	Cum %
95	15.0	1	1
90	14.5	1	2
85	14.0	2	4
80	13.0	5	9
75	12.5	5	14
70	12.0	11	25
65	11.5	9	34
60	11.0	10	44
55	10.0	13	57
50	9.5	10	67
45	9.0	10	77
40	8.5	6	83
35	8.0	7	90
30	7.5	3	93
25 & Below	7.0	7	100
Mean Reading Grade	10.0		
Median Reading Grade	10.6		
Probable Error	+ 0.1		

[a]Selector AI for Courses 53230, 53430—Mechanical

Table 23. **Reading Comprehension Grade Distributions of Airmen Assigned to Career Field 22A—Facilities[a]**

(N = 1,711)

General AI	Reading Grade Level	%	Cum %
95	15.0	2	2
90	14.5	2	4
85	14.0	4	8
80	13.0	5	13
75	12.5	7	20
70	12.0	12	32
65	11.5	11	43
60	11.0	10	53
55	10.0	9	62
50	9.5	8	70
45	9.0	10	80
40	8.5	6	86
35	8.0	5	91
30	7.5	3	94
25 & Below	7.0	6	100
Mean Reading Grade	10.6		
Median Reading Grade	11.2		
Probable Error	± 0.4		

[a]Selector AI for Courses 54330, 54430, 54530, 54630—Mechanical

Table 24. **Reading Comprehension Grade Distributions of Airmen Assigned to Career Field 24—Utilities[a]**

(N = 368)

General AI	Reading Grade Level	%	Cum %
95	15.0	2	2
90	14.5	2	4
85	14.0	5	9
80	13.0	7	16
75	12.5	11	27
70	12.0	18	45
65	11.5	10	55
60	11.0	9	64
55	10.0	9	73
50	9.5	6	79
45	9.0	6	85
40	8.5	6	91
35	8.0	3	94
30	7.5	3	97
25 & Below	7.0	3	100
Mean Reading Grade	11.1		
Median Reading Grade	11.7		
Probable Error	± 0.6		

[a]Selector AI for Course 56430—Mechanical

Table 25. **Reading Comprehension Grade Distributions of Airmen Assigned to Career Field 25 – Fire Protection[a]**

(N = 842)

General AI	Reading Grade Level	%	Cum %
95	15.0	0	0
90	14.5	1	1
85	14.0	1	2
80	13.0	1	3
75	12.5	3	6
70	12.0	7	13
65	11.5	6	19
60	11.0	8	27
55	10.0	12	39
50	9.5	11	50
45	9.0	12	62
40	8.5	11	73
35	8.0	8	81
30	7.5	8	89
25 & Below	7.0	11	100
Mean Reading Grade	9.3		
Median Reading Grade	9.5		
Probable Error	± 0.1		

[a]Selector AI for Course 57130 – Mechanical

Table 26. **Reading Comprehension Grade Distributions of Airmen Assigned to Career Field 30B – Fuel Specialist[a]**

(N = 510)

General AI	Reading Grade Level	%	Cum %
95	15.0	0	0
90	14.5	0	0
85	14.0	1	1
80	13.0	2	3
75	12.5	5	8
70	12.0	11	19
65	11.5	8	27
60	11.0	8	35
55	10.0	12	47
50	9.5	11	58
45	9.0	11	69
40	8.5	10	79
35	8.0	7	86
30	7.5	7	93
25 & Below	7.0	7	100
Mean Reading Grade	9.6		
Median Reading Grade	9.8		
Probable Error	± 0.1		

[a]Selector AI for Course 64330 – Mechanical

Table 27. **Reading Comprehension Grade Distributions of Airmen Assigned to Career Field 9 – Radio-Radar Systems[a]**

(N = 6,818)

General AI	Reading Grade Level	%	Cum %
95	15.0	10	10
90	14.5	9	19
85	14.0	10	29
80	13.0	11	40
75	12.5	13	53
70	12.0	17	70
65	11.5	9	79
60	11.0	7	86
55	10.0	5	91
50	9.5	4	95
45	9.0	2	97
40	8.5	2	99
35 & Below	8.0	1	100
Mean Reading Grade	12.3		
Median Reading Grade	12.6		
Probable Error	+ 0.4		

[a]Selector AI for Courses 30130, 30131, 30133, 30230, 30330, 30331, 30332, 30430, 30431, 30432, 30433, 30630 – Electronics

Table 28. **Reading Comprehension Grade Distributions of Airmen Assigned to Career Field 10 – Missile Electronic Maintenance[a]**

(N = 658)

General AI	Reading Grade Level	%	Cum %
95	15.0	27	27
90	14.5	15	42
85	14.0	15	57
80	13.0	10	67
75	12.5	9	76
70	12.0	11	87
65	11.5	4	91
60	11.0	4	95
55	10.0	2	97
50	9.5	1	98
45	9.0	1	99
40 & Below	8.5	1	100
Mean Reading Grade	13.2		
Median Reading Grade	14.3		
Probable Error	+ 0.6		

[a]Selector AI for Courses 31130-31531, 31132-31432, 31330, 31433 – Electronics

Table 29. **Reading Comprehension Grade Distributions of Airmen Assigned to Career Field 11—Armament Systems Maintenance and Operator***

(N = 1,293)

General AI	Reading Grade Level	%	Cum %
95	15.0	16	16
90	14.5	13	29
85	14.0	14	43
80	13.0	13	56
75	12.5	10	66
70	12.0	15	81
65	11.5	8	89
60	11.0	5	94
55	10.0	3	97
50	9.5	2	99
45 & Below	9.0	1	100
Mean Reading Grade	12.8		
Median Reading Grade	13.2		
Probable Error	+ 0.4		

*Selector AI for Courses 32130, 32230, 32231—Electronics

Table 30. **Reading Comprehension Grade Distributions of Airmen Assigned to Career Field 12—Nuclear Weapons***

(N = 620)

General AI	Reading Grade Level	%	Cum %
95	15.0	23	23
90	14.5	16	39
85	14.0	15	54
80	13.0	12	66
75	12.5	11	77
70	12.0	12	89
65	11.5	4	93
60	11.0	4	97
55	10.0	1	98
50	9.5	1	99
45 & Below	9.0	1	100
Mean Reading Grade	13.2		
Median Reading Grade	14.1		
Probable Error	+ 0.5		

*Selector AI for Courses 33130, 99125—Electronics

Table 31. **Reading Comprehension Grade Distributions of Airmen Assigned to Career Field 14B – Wire Maintenance, Electro-Mechanical[a]**

(N = 391)

General AI	Reading Grade Level	%	Cum %
95	15.0	3	3
90	14.5	3	6
85	14.0	7	13
80	13.0	7	20
75	12.5	9	29
70	12.0	17	46
65	11.5	10	56
60	11.0	11	67
55	10.0	10	77
50	9.5	9	86
45	9.0	6	92
40	8.5	4	96
35	8.0	2	98
30	7.5	1	99
25 & Below	7.0	1	100
Mean Reading Grade	11.4		
Median Reading Grade	11.8		
Probable Error	+ 0.4		

[a]Selector AI for Course 36330 – Electronics

Table 32. **Reading Comprehension Grade Distributions of Airmen Assigned to Career Field 16B – Aircraft Electrical Accessory Maintenance[a]**

(N = 2,640)

General AI	Reading Grade Level	%	Cum %
95	15.0	4	4
90	14.5	3	7
85	14.0	4	11
80	13.0	7	18
75	12.5	7	25
70	12.0	14	39
65	11.5	10	49
60	11.0	10	59
55	10.0	9	68
50	9.5	9	77
45	9.0	7	84
40	8.5	7	91
35	8.0	3	94
30	7.5	2	96
25 & Below	7.0	4	100
Mean Reading Grade	11.1		
Median Reading Grade	11.5		
Probable Error	+ 0.4		

[a]Selector AI for Courses 42133, 42230, 42330, 42333 – Electronics

Table 33. **Reading Comprehension Grade Distributions of Airmen Assigned to Career Field 22B—Facilities, Missile[a]**

(N = 156)

General AI	Reading Grade Level	%	Cum %
95	15.0	3	3
90	14.5	1	4
85	14.0	7	11
80	13.0	5	16
75	12.5	8	24
70	12.0	17	41
65	11.5	11	52
60	11.0	7	59
55	10.0	8	67
50	9.5	12	79
45	9.0	6	85
40	8.5	4	89
35	8.0	6	95
30	7.5	2	97
25 & Below	7.0	3	100
Mean Reading Grade	11.1		
Median Reading Grade	11.6		
Probable Error	+ 0.5		

[a]Selector AI for Course 54130—Electronics

APPENDIX I. STATISTICAL TABLES

Table 34. **[illegible] Variables, AFQT, and California Reading Test**

(Sample: 483 Basic Airmen Tested)

Variable	Mean	SD	Correlations																	
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1 AFQT	62.2	20.5		79	88	78	73	47	63	61	55	60	56	67	62	54	57	22	55	61	61
2 General AI	62.9	20.5			89	74	82	56	73	69	47	28	68	54	61	23	83	41	77	79	82
3 Administrative AI	57.8	22.3				60	80	80	80	66	42	22	43	46	53	19	77	44	76	80	82
4 Mechanical AI	63.9	21.5					77	39	53	56	60	69	71	76	68	67	50	23	48	55	54
5 Electronics AI	65.1	21.9						57	81	74	65	44	55	64	78	38	59	31	60	71	69
6 Arithmetic Computation	20.3	6.9							65	51	24	13	30	31	40	16	39	32	47	57	55
7 Arithmetic Reasoning	8.6	3.8								66	41	26	41	51	55	23	49	27	51	65	61
8 Data Interpretation	5.7	2.1									38	29	50	47	55	23	54	26	54	65	63
9 Electrical Information	7.4	3.5										64	31	55	42	51	45	14	45	44	47
10 General Mechanics	8.1	3.5											26	56	38	25	27	3	24	26	26
11 Hidden Figures	8.1	4.0												49	61	27	37	16	35	45	42
12 Mechanical Principles	8.5	3.1													63	49	43	12	39	46	45
13 Pattern Comprehension	9.3	4.4														39	41	19	39	52	48
14 Shop Practices	8.3	3.4															19	5	17	22	20
15 Word Knowledge	18.8	6.4																38	85	77	85
16 Years of Education	12.1	1.2																	41	40	42
17 California Vocabulary	11.3	2.5																		82	95
18 California Comprehension	10.7	2.4																			96
19 California Total Reading	11.0	2.3																			

Table 35. Correlations Between AQE-64 Variables, AFQT, and Davis Reading Test

(Sample: 946 Basic Airmen Tested)

	Variable	Mean	SD	Correlations																	
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	AFQT	61.2	23.1		71	67	75	75	49	66	58	59	60	53	68	63	52	59	26	61	57
2	General AI	60.6	21.8			90	77	85	62	76	69	53	38	69	59	62	28	84	44	74	71
3	Administrative AI	55.8	24.1				65	81	83	79	67	49	34	46	51	52	24	82	47	74	68
4	Mechanical AI	60.4	23.2					81	46	59	59	67	72	72	78	66	68	53	32	53	51
5	Electronics AI	61.0	23.1						59	81	76	71	52	58	69	78	44	63	37	65	61
6	Arithmetic Computation	19.9	7.6							63	52	31	22	36	35	41	16	51	35	54	45
7	Arithmetic Reasoning	8.2	4.0								64	47	38	44	56	55	30	56	27	61	56
8	Data Interpretation	5.4	2.3									44	33	50	53	53	28	57	32	62	59
9	Electrical Information	7.1	3.6										68	38	60	49	56	48	22	47	43
10	General Mechanics	7.7	3.7											32	58	40	76	34	12	36	30
11	Hidden Figures	7.6	4.9												51	61	31	39	22	42	42
12	Mechanical Principles	8.0	3.1													62	51	44	18	48	45
13	Pattern Comprehension	8.3	4.4														39	42	26	45	42
14	Shop Practices	8.1	3.3															23	5	22	20
15	Word Knowledge	18.5	6.6																40	77	72
16	Years of Education	11.9	1.4																	33	31
17	Davis Speed of Comprehension	69.5	7.8																		90
18	Davis Level of Comprehension	67.4	8.2																		

Table 36. **Distributions of California Reading Comprehension Test Scores for High School Graduates and High School Nongraduates**

(Sample: Non-Prior-Service Male Basic Airmen Tested in March 1965)

Reading Test Raw Score	Reading Grade	High School Graduates f	%	High School Nongraduates f	%	Total Sample f	%
73 - 84	15	13	3	2	2	15	3
63 - 72	14	52	13	4	4	56	12
55 - 62	13	60	15	9	10	69	14
49 - 54	12	65	18	6	7	71	15
45 - 48	11	40	10	8	9	48	10
40 - 44	10	33	8	10	11	43	9
35 - 39	9	53	14	16	17	69	14
28 - 34	8	49	13	18	20	67	13
20 - 27	7	21	5	16	17	37	8
1 - 19	6	5	1	3	3	8	2
N		391	100	92	100	483	100
Mean Grade		11.0		9.4		10.7	
Median Grade		11.9		9.6		11.4	
SD		2.3		2.3		2.4	

Table 37. **Distributions of Davis Reading Comprehension Level Test Scores for High School Graduates and High School Nongraduates**

(Sample: Non-Prior-Service Male Basic Airmen Tested in March 1965)

Reading Test Scaled Score	High School Graduates f	%	High School Nongraduates f	%	Total Sample f	%
93 - 96	14	2	0	0	14	1
89 - 92	23	3	2	1	25	3
85 - 88	1	0	0	0	1	0
81 - 84	28	4	1	0	29	3
77 - 80	88	12	9	4	97	10
73 - 76	92	12	18	9	110	12
69 - 72	134	18	27	14	161	17
65 - 68	146	20	43	21	189	20
61 - 64	164	22	64	32	228	24
57 - 60	31	4	27	14	58	6
53 - 56	18	2	7	4	25	3
49 - 52	6	1	3	1	9	1
N	745	100	201	100	946	100
Mean	68.4		64.0		67.4	
Median	69.0		64.9		68.0	
SD	8.4		6.4		8.2	

APPENDIX II. STATISTICAL COMPUTATIONS

In the text it was noted that the conversion tables would be expected to yield unbiased estimates of reading ability from knowledge of the AQE General Aptitude Index only when the group (or case) to whom the conversion was applied was a random (unbiased) sample of the population from which the group upon which the conversion table was developed was also a random sample. It was noted that the career field groups probably did not meet this criteria of randomness and probable error values were supplied which could be applied to each career field to correct the estimated reading ability scores for this lack of randomness. To obtain the probable error values, regression equations were first computed to predict reading grade level from the General AI and each of the other three AIs in turn from data given in Table 34. These equations are shown in Table 38. The appropriate equation was then applied to each career field sample (using General AI mean and selector AI mean in the sample) to compute a predicted reading grade mean. This predicted mean was then subtracted from the estimated reading grade mean (obtained via the conversion table) to obtain a probable error for each career field as indicated in Table 39.

The appropriate probable error value can be used, if desired, to adjust the estimated reading grade (obtained by use of the conversion table) of an airman in any career field up or down to obtain what may be a slightly better estimate of reading grade level. Alternatively, when both the General AI and the selector AI are available for any airman, the appropriate regression equation may be used to obtain an estimated reading grade level. For example, Airman X in career field 30 (Supply) has a General AI of 60 and an Administrative (the selector AI for this career field) AI of 90. When these values are entered in the regression equation for Administrative career fields, the reading grade level is estimated to be 12.2 (.0437(60) + .0501(90) + 5.0730 = 12.2040).

Table 38. **Equations for Predicting Reading Grade Level**

Career Fields for which the selector AI is Administrative
RGL = .0437 Gen AI + .0501 Ad AI + 5.0730
Career Fields for which the selector AI is Mechanical
RGL = .0991 Gen AI - .0085 Mech AI + 5.0459
Career Fields for which the selector AI is Electronics
RGL = .0743 Gen AI + .0222 El AI + 4.6088

Table 39. **Probable Errors When Conversion Table Is Used to Obtain Estimated Reading Grade Levels for Career Field Groups**

Career Field	General AI Mean	Selector AI and Mean		Predicted RGL	Estimated RGL	Probable Error
8B	53	Admin	72	11.0	10.0	-1.0
8C	60	Admin	79	11.6	11.4	-0.2
30A	45	Admin	63	10.2	9.0	-1.2
32	68	Admin	91	12.6	12.2	-0.4
34A	62	Admin	81	11.8	11.2	-0.6
34B	51	Admin	70	10.8	9.6	-1.2
14A	58	Mech	72	10.2	10.5	+0.3
16A	61	Mech	77	10.4	11.1	+0.7
17	52	Mech	64	9.7	9.7	0
18	70	Mech	89	11.2	12.0	+0.8
20	61	Mech	78	10.4	11.1	+0.7
21	55	Mech	72	9.9	10.0	+0.1
22A	58	Mech	72	10.2	10.6	+0.4
24	62	Mech	73	10.6	11.2	+0.6
25	49	Mech	63	9.4	9.3	-0.1
30B	52	Mech	64	9.7	9.6	-0.1
9	73	Elect	82	11.9	12.3	+0.4
10	81	Elect	91	12.6	13.2	+0.6
11	78	Elect	88	12.4	12.8	+0.4
12	82	Elect	90	12.7	13.2	+0.5
14B	65	Elect	70	11.0	11.4	+0.4
16B	61	Elect	68	10.7	11.1	+0.4
22B	61	Elect	67	10.6	11.1	+0.5

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13. ABSTRACT

Conversion tables are presented for estimating reading achievement (reading grade level as measured by the California Achievement Test and scaled score as measured by the Davis Reading Test) from the AQE General Aptitude Index. Distributions of estimated reading grade are shown for non-prior-service airmen entering the Air Force in 1964 and 1965 for the total group and for subgroups split on years of education completed. Distributions of estimated reading grade are also presented by career field for airmen assigned to 29 career fields. It was pointed out that a wide range of reading ability was found within each career field and that the career fields differed considerably with respect to average reading ability. Implications for writing of Career Development Courses and technical manuals were discussed.

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Security Classification

14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
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career field						
estimated reading ability						
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